ATTACHMENT K

Tabulation of Bad River Monitoring Data
Marengo River

Marengo River Data

		E. coli CFU/100 mL		
Date	**Tributary**	**On Reservation**	**1 mile upstream**	**2 miles upstream**
May-01		122	1380	
Jun-01		144	187	
Jul-01		NS	NS	
Aug-01		160	475	
Sep-01		145	160	
Oct-01		95	65	
Nov-01		30	40	
Dec-01		2530	2070	
Jan-02		16	NS	
Feb-02		44	NS	
Mar-02		45	NS	
Apr-02		80	18	
May-02		46	20	
Aug-02		90	80	
Sep-02		11500	18687	
Feb-03		0	NS	
Apr-03		20	40	
Aug-03		4160	7000	
Oct-03		40	90	
Feb-04		2	NS	
Mar-04	0	0	0	0
Jun-04	40	40	20	20
Aug-04	230	220	220	120
Oct-04	4240	0	20	20
Feb-05	NS	0	NS	NS
Apr-05	20	80	20	20
Jun-05	20	80	60	140
Aug-05	1120	1600	1360	1520
Oct-05	60	0	0	0

E.coli - sampled according to Bad River Water Lab Quality Assurance Project Plan approved by the USEPA, **1986 Criteria for Bacteriological Indicators = 235 E.coli single sample maximum**

Tributary - tributary to Marengo River located within the exterior boundary at small farm on south end of Reservation

1 mile upstream - at the unsewered town of Marengo, approximately 1 mile upstream of the Reservation boundary

2 miles upstream - at a site surrounded by dairy farms, approximately 2 miles upstream of the Reservation boundary

NS - not sampled

NOTE: The "On Reservation" and "1 mile upstream" sites have also been monitored since 1997 for fecal coliforms as Wisconsin Water Quality Standards use fecal coliforms and not yet E.coli

ATTACHMENT L

Data Analysis of the Marengo River Watershed. AW Research Lab, Inc. February 2004.

(aerial photo analysis for nonpoint pollution sources on and off Bad River Reservation)

The portion reproduced here includes only the summary report and example summary overlays for the study area. Note that the squared line in the included summary aerial photos delineates the southwestern boundary of the Reservation. Influences counted occur both on and off the Reservation. The main body of this report consists of the actual 353 aerial photos that were analyzed to create this report.

Marengo River Watershed Influence Maps

February 2004

A.W. Research Laboratories, Inc.
16326 Airport Road · Brainerd, Minnesota 56401 · Phone: (218) 829-7974 · Fax: (218) 829-1316

Date: January 30, 2004

To: Kirsten Cahow
Bad River Natural Resources Dept.
Chief Blackbird Center
1 Maple Lane
Odanah, WI 54861

Subject: Statistical Review and Recommendations for the Marengo River Watershed Aerial Survey and Analysis

From: Alan W. Cibuzar
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Introduction

Visible range aerial image data were recorded of a portion of the Marengo River Watershed on May 15, 2003 with a D100 6.3 mega pixel camera. A.W. Research Laboratories, Inc. was retained to analyze and report nutrient or toxic sources documented in the recorded portion of the watershed.

The following summary reports and discusses the data derived from the aerial data interpretation and recommends focus areas where resource management can be implemented to terminate or manage the nutrient or toxic loading.

Summary

The following data tables are sorted to provide the Image with the greatest number of influences to be listed first and the lowest number of influence to be listed last. If no influence occurred, the Image is not listed.

The influences analyzed are listed as follows:

Influences Counted

1. Number of Dwellings
2. Dwellings within 200 feet of Surface Water
3. Feedlot Runoff
4. Possible Toxic Source
5. Runoff Point Sources
6. Watercourse Crossings

Influences Observed

7. Runoff from Non-Point Vegetated Fields
8. Runoff from Non-Point Barren Fields
9. Runoff from Non-Point Road Ditches

Recommendations suggested to control non-point sources

10. Bank Stabilization
11. Conservation Tillage
12. Installation of Sediment Traps
13. Development and Maintenance of a Vegetative Buffer
14. Wetland Management
15. Forest Management

Table 1 provides an overall synopsis of each influence or recommendation observed.

Table 1
Number and Percentage of Influences and Recommendations

Influences	**Total Number of Images with the Influence**	**Total Number of Occurrences from all Images**	**Percentage of Images Containing the Influence**
Number of Dwellings	292	1220	82.7
Dwellings within 200 ft. of the Water	48	83	13.6
Feed Lot Runoff	86	103	14.4
Possible Toxic Sources	194	427	55
Runoff Point Sources	173	458	49
Watercourse Crossings	109	171	30.9
Runoff Non-Point Vegetated Field Source	317		89.8
Runoff Barren Field Source	176		49.9
Runoff Non-Point Road Ditch	296		83.9
Recommendations	**Total Number of Images with the Recommendation**	**Total Number of Occurrences from all Images**	**Percentage of Images Containing the Recommendation**
Berm	39		11
Stabilize Bank	140		39.7
Conservation Tillage	156		44.2
Install Sediment Traps	203		57.5
Develop/Maintain Vegetative Buffer	335		94.9
Wetland Management	136		38.5
Forest Management	96		27.2

The "Total Number of Occurrences from all Images", listed in Table 1, represents the influences that were counted in each image. Due to the overlap in images an influence in one image may have been counted in two images. Although an effort was made not to count an object twice, we are sure some were. The same double counting may have taken place with the "Total Number of Images with the Influence" also listed in Table 1.

Table 2
Total Number of Counted Occurrences

Influence	Total Number of Occurrences from all Images	Percentage of Images Containing the Influence
Number of Dwellings	1220	82.7
Runoff Point Sources	458	49
Possible Toxic Sources	427	55
Watercourse Crossings	171	30.9
Feed Lot Runoff	103	14.4
Dwellings with 200 ft. of the Water	83	13.6

Table 2 lists the Total Number of Occurrences from Table 1. Dwellings (septic systems) rank the highest followed by Runoff Point Sources. The number of possible toxic sources (small dumps) is surprising.

Table 3
Total Number of Images with Influences

Influence	Total Number of Images with the Influence	Percentage of Images Containing the Influence
Runoff Non-Point Vegetated Field Source	317	89.8
Runoff Non-Point Road Ditch	296	83.9
Number of Dwellings	292	82.7
Possible Toxic Sources	194	55
Runoff Barren Field Source	176	49.9
Runoff Point Sources	173	49
Watercourse Crossings	109	30.9
Feed Lot Runoff	86	14.4
Dwellings with 200 ft. of the Water	48	13.6

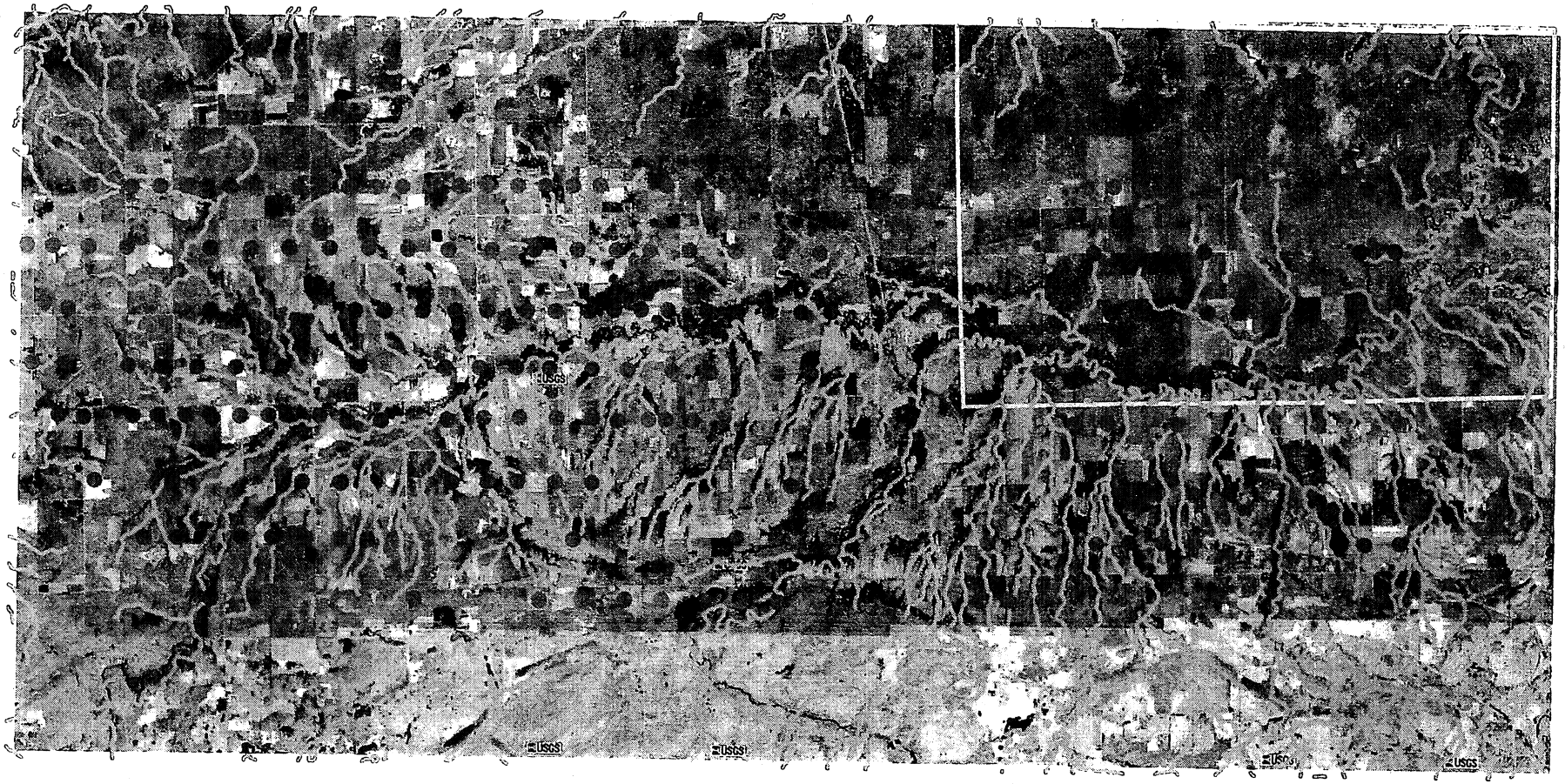
Table 3 lists the total number of images with specific influences. Runoff non-point vegetated Field Source ranks at the top followed by Runoff Non-Point Road Ditch and ranked third is Dwellings (septic systems).

Table 4
Total Number of Images with Specific Recommendations

Recommendations	Total Number of Images with Specific Recommendations	Percentage of Images Containing Specific Recommendations
Develop/Maintain Vegetative Buffer	335	94.9
Install Sediment Traps	203	57.5
Conservation Tillage	156	44.2
Stabilize Bank	140	39.7
Wetland Management	136	38.5
Forest Management	96	27.2
Berm	39	11

Table 4 lists the ranking of recommendations. Developing and Maintaining a Vegetative Buffer ranked overwhelmingly the highest. Educational programs for landowners developing vegetative buffers, their benefits and maintenance should be developed and implemented.

Non-point Runoff Barren Fields



Non-point runoff barren field

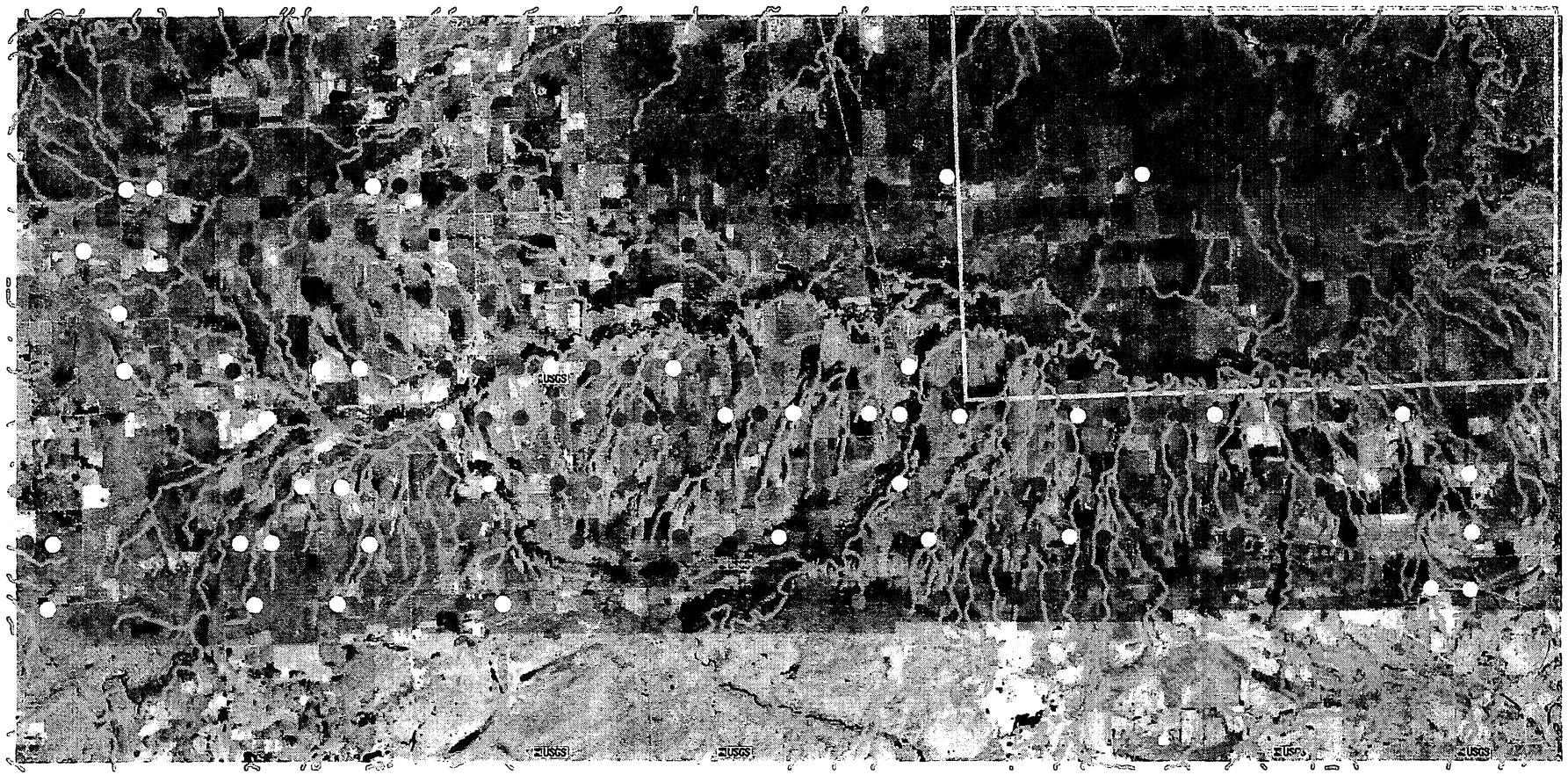
X

River clip.shp

Boundry clip.shp

N

Runoff Point Sources



Runoff point source
- 6 - 8
- 4 - 5
- 3
- 2
- 1

River clip.shp

Boundry clip.shp

N

ATTACHMENT M

Tabulation of Bad River's Macroinvertebrate sampling

Site	Year Sampled	HBI Score*	Result	Taxa Richness	EPT Richness	%EPTpc	% Chironomid	% Diptera**
Bad R. @ Falls (6/18/01)	2001	3.92	Very Good	38	17	49	32	NA
Bad R. @ Falls (11/01/01)	2001	3.13	Excellent	40	21	80	3	NA
Bad R. @ Falls	2002	2.55	Excellent	16	10	74	2	20
Bad R. @ Falls	2003	1.94	Excellent	32	20	77	1	10
Bad R. @ Falls	2004	1.74	Excellent	42	25	67	9	10
Bad R. @ Rte 169	2001	3.23	Excellent	37	22	46	5	NA
Bad R. @ Rte 169	2002	3.11	Excellent	15	9	68	0	4
Bad R. @ Rte 169 (Duplicate)	2002	2.36	Excellent	13	8	82	2	7
Bad R. @ Rte 169	2003	2.23	Excellent	39	15	63	8	11
Bad R. @ Rte 169 (Debris)	2003	2.99	Excellent	49	24	37	34	38
Bad R. @ Rte 169	2004	2.48	Excellent	48	22	52	4	14
Graveyard Creek @ BH Rd.	2001	3.8	Very Good	18	6	31	1	NA
Graveyard Creek @ BH Rd.	2002	4.21	Very Good	11	6	35	13	17
Graveyard Creek @ BH Rd.	2003	2.57	Excellent	24	8	62	7	18
Graveyard Creek @ BH Rd.	2004	2.99	Excellent	26	7	40	6	28
Marengo R. @ Gov't Rd.	2001	2.06	Excellent	41	12	21	4	NA
Marengo R. @ Gov't Rd.	2002	3.30	Excellent	20	12	48	5	9
Marengo R. @ Gov't Rd.	2003	3.38	Excellent	57	19	18	12	15
Marengo R. @ Gov't Rd.	2004	1.82	Excellent	48	16	48	0	6
Potato R. @ PRR	2001	2.65	Excellent	31	19	76	3	NA
Potato R. @ PRR	2002	2.93	Excellent	16	9	74	1	9
Potato R. @ PRR	2003	1.47	Excellent	33	18	74	2	8
Potato R. @ PRR (Duplicate)	2003	1.40	Excellent	30	18	70	2	10
Potato R. @ PRR	2004	1.32	Excellent	48	28	81	2	6
White R. @ Thornapple Cr	2001	1.01	Excellent	32	10	21	1	NA
White R. @ Thornapple Cr	2002	2.65	Excellent	18	12	67	1	12
White R. @ Thornapple Cr, Spr	2003	2.03	Excellent	29	14	50	3	4
White R. @ Thornapple Cr, Fall	2003	3.35	Excellent	45	13	22	8	13
White R. @ Thornapple Cr	2004	2.20	Excellent	62	20	51	2	6
Beartrap Creek @ Triangle Road	2002	5.06	Good	14	3	47	34	34
Beartrap Creek @ Triangle Road	2004	2.98	Excellent	36	4	36	1	10
Beartrap Creek @ Cty A	2001	5.28	Good	30	5	53	17	NA
Beartrap Creek @ Cty A	2002	3.78	Very Good	12	4	26	4	20
Beartrap Creek @ Cty A	2003	3.95	Very Good	41	4	12	11	12
Beartrap Creek @ Cty A	2004	4.06	Very Good	41	4	32	18	19

*Scores in 2001 and 2002 were based on family biotic index, and starting in 2003 the scores are now based on genus and species.

**% Diptera was not calculated in 2001